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IMPACTS OF VISITORS ON BREEDING SEABIRDS
ON THE ISLE OF MAY
NATIONAL NATURE RESERVE

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Report to Scottish Natural Heritage

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SUMMARY

- 1 A record number of people visited the Isle of May in May and June 1995. Most were present 1100-1700 hr and remained for 2.5 hr. The south end of the island received the most visitors.
- 2 Most visitors respected the rules of the reserve and kept to the paths. There were, however, some serious incidents at the north end which resulted in the losses of eggs and chicks.
- 3 Guillemot colonies which were visited regularly had a lower nesting success than those which were not. The situation was less clear for the shag whereas razorbill, puffin and kittiwake appeared unaffected.
- 4 Eiders nesting close to paths had a significantly lower hatching success than those nesting further away.
- 5 Unless there was severe disturbance, incubating birds rarely left their eggs or chicks but visiting areas did cause off-duty and nonbreeding birds to fly away, especially from areas rarely visited by people.
- 6 The current number of visitors, and the timing of their visits, pose little threat to the total numbers of birds on the Isle of May but might prevent colonies from expanding. The level of wardening when people are present should be increased.
- 7 Any increase in numbers of visitors, or an extension of the hours visitors are allowed, would inevitably pose a threat to guillemots and puffins.
- 8 The provision of facilities for photographers should be considered.

1 BACKGROUND

The Isle of May is a designated Special Protection Area having been classified as part of the Forth Islands Special Protection Area by the Secretary of State for Scotland on 25 April 1990. In addition, the Isle of May is one of four strategic seabird monitoring sites in Great Britain in the scheme run by the Joint Nature Conservation Committee.

Over the past 7 years visitor numbers to the May have increased from 1,738 in 1988 to a record 5,427 in 1994. Information on disturbance of breeding birds by visitors has in the past been largely anecdotal. Scottish Natural Heritage (SNH) is coming under increasing pressure from tourist boat operators, North East Fife Tourist Board and local councillors to increase visitor numbers to the May to boost the local economy. At present visitor numbers are controlled by a system of boat licences. SNH is concerned that a further increase in visitor numbers will result in:-

- (i) Unacceptable levels of disturbance to breeding seabirds
- (ii) Further erosion of footpaths
- (iii) Disruption/disturbance to research projects.

SNH needs to establish the current impact of visitors on the breeding seabird populations on the Isle of May to enable a review of visitor management to be undertaken and to establish clear management policies for future visitor use of the reserve.

To assess the impact of present visitor numbers on the breeding seabirds of the Isle of May.

METHODOLOGIES

1. The breeding performance (hatching success/fledging success) of key seabird species (shag, guillemot, razorbill, eider, puffin, terns) in disturbed and undisturbed areas were compared. As far as possible, disturbed and undisturbed areas were selected to be similar in terms of aspect and height above sea level.
2. The habituation of birds to visitor pressure was assessed by recording flushing distances of cliff-nesting species in visited and unvisited areas.
3. The behaviour and number and duration of visits by tourists to disturbed areas were recorded. Disturbance incidents, eg. flushing birds, resultant gull predation were documented. These observations were made from the North and South Horns.

The contract for this work was not received for signing until 17 May. Although some preliminary studies were started in anticipation of this outcome, the programme of work was modified slightly to accommodate the late start. Priority was given to monitoring breeding success and visitor disturbance. The terns were a subject of a separate study by Nigel Harding so no observations of these were made.

3 VISITORS

3.1 Methods

3.1.1 Observations were concentrated on areas which were easily visible from the tops of the North and South Horns. The former allowed a clear view of people from when they came up the slope north of Nybo Bridge to the end of the path at the Far North Viewpoint. The groups of birds watched are shown on Figure 1. The South Horn allowed observations of visitors when they were at Lady's Bed and between Lady's Cave and Pilgrim's Haven (Figure 2). People were also clearly visible on South Plateau between Cornerstone and the north side of Greenface, including the Greenface viewing area.

3.1.2 The following areas were selected for detailed observations as the birds nesting in them were being monitored. The numbers of eggs/chicks present were counted before boats had landed people and after the boats had left (section 4). The locations are shown in Figures 1 & 2.

- South side of North Horn Gully - Visitors to this area had left the path
- North side of North Horn Gully - This is a designated viewpoint
- Far North Viewpoint
- Lady's Bed Viewpoint
- Lady's Cave - Visitors to this area had left the path
- Chatterstones - Visitors to this area had left the path
- Greenface Viewpoint - Not shown in Figure 2.

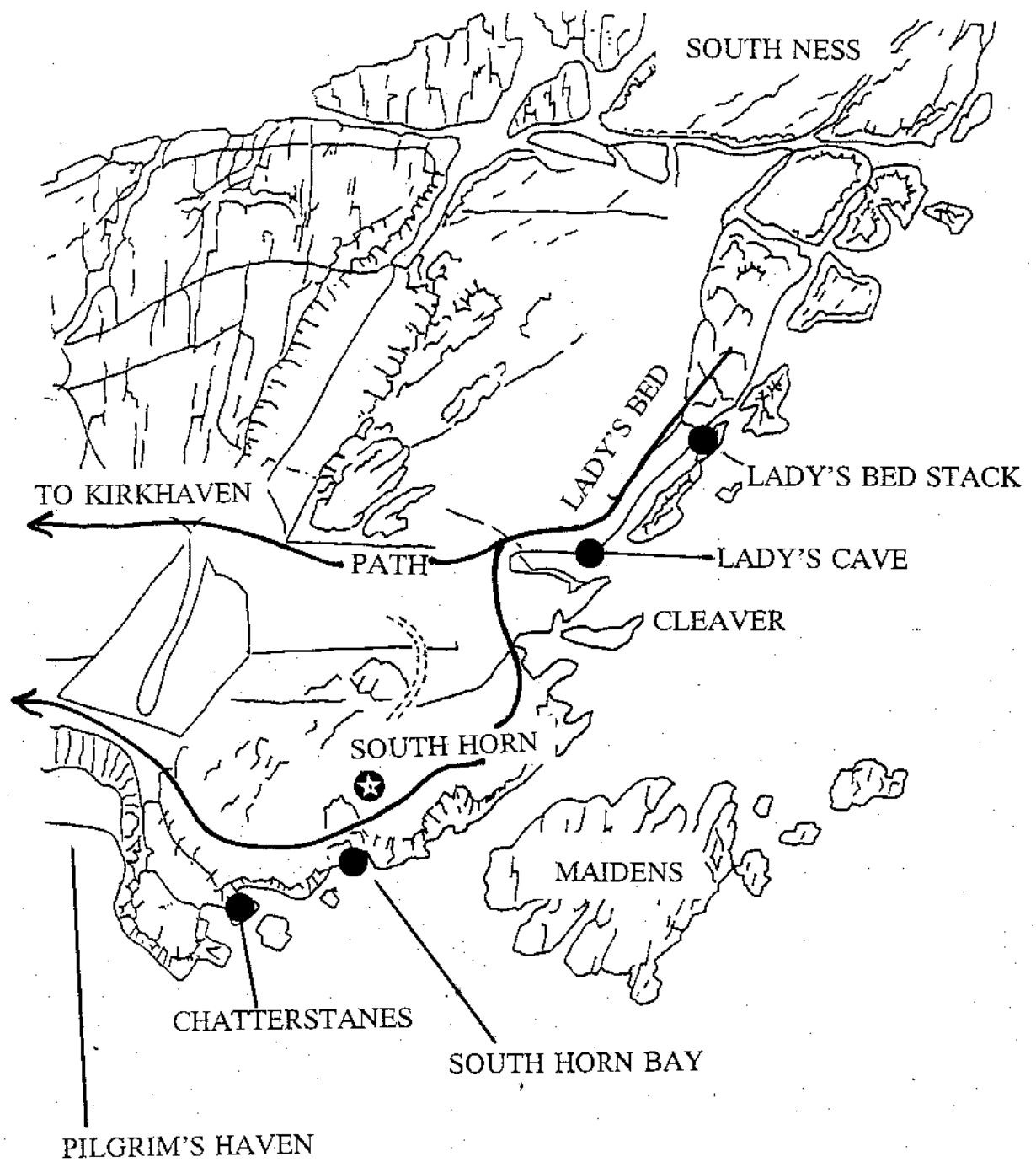


Figure 1. Place names and locations of colonies (solid circles) at the south end of the Isle of May where the behaviour of visitors was studied from the North Horn in 1995.

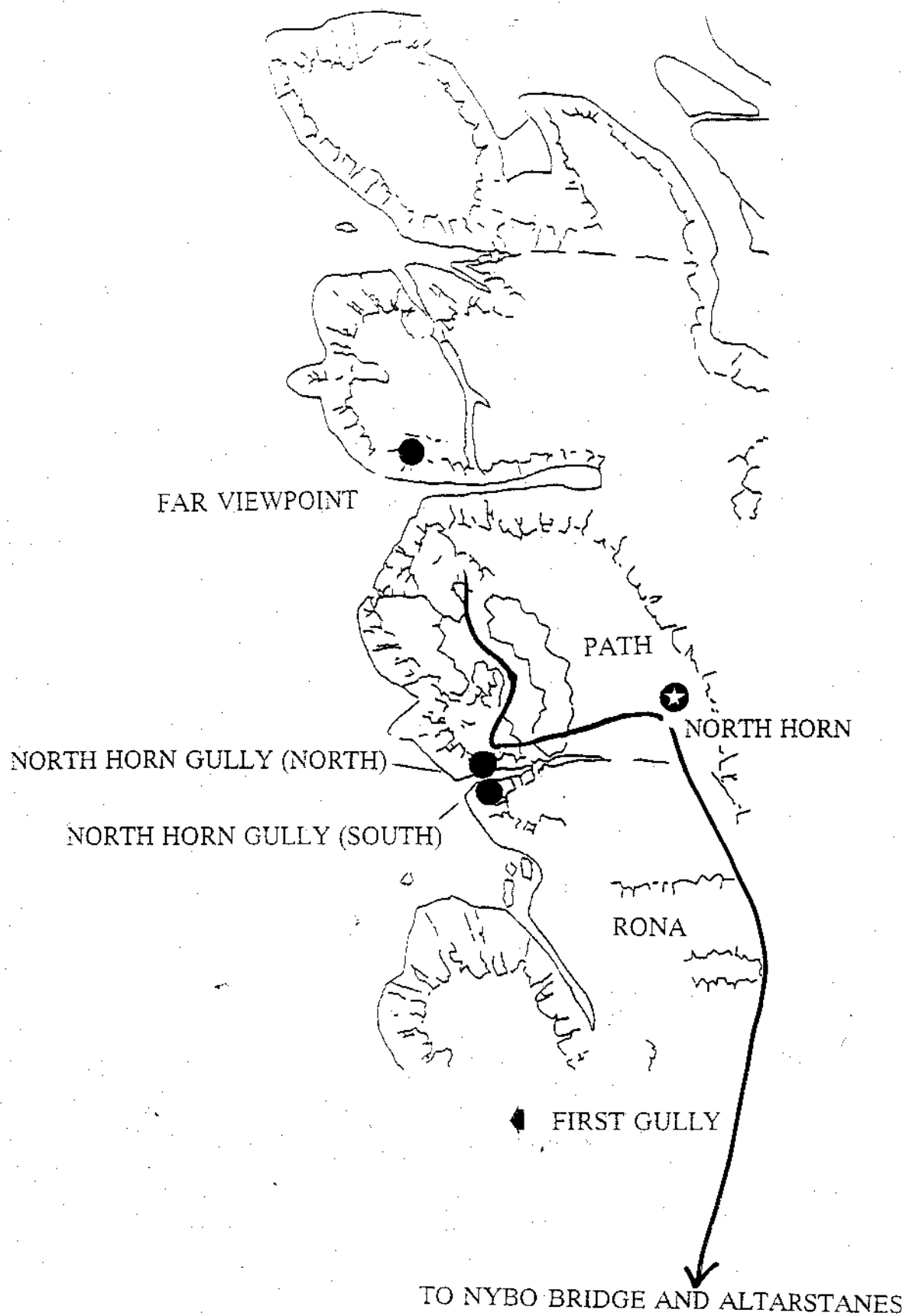


Figure 2. Place names and locations of colonies (solid circles) at the north end of the Isle of May where the behaviour of visitors was studied from the South Horn in 1995.

3.1.3 We took up position in the Horns just prior to the arrival of the tourist boats and left just after visitors had departed. As far as we know visitors were unaware of our presence. Observations were concentrated on days and times when Serenity and/or Sapphire, or a cruise boat landed visitors. Usage of each area and observations of people leaving the path were recorded.

3.1.4 Details of visitor landings, including which landing was used, times visitors were ashore and the number of visitors were abstracted from the warden's log-books. For each hour and day an estimate of usage was calculated by multiplying the number of visitors present by the time ashore (in minutes). This included all visitors landing but excluded people resident in Fluke Street, the Low Light and the main Lighthouse.

3.2 Results

3.2.1 Numbers

Landings were made on 21 days in May and 23 days in June (Table 1). Between 28 April and 30 June licensed visitor and private boats landed 2317 people. This was by far the highest total visiting the reserve over this period (Table 2). 84% of visitors were landed by the four licensed boats, 10% were from three landings by cruise boats and 6% were from private yachts, canoes, etc. A further 400 visitors were landed on 7 days 1-9 July. Details of all landings 28 April-9 July are included in subsequent analyses.

There was a suggestion of a slight increase in the daily number of visitors landing as the season progressed but the trend was not significant (Figure 3).

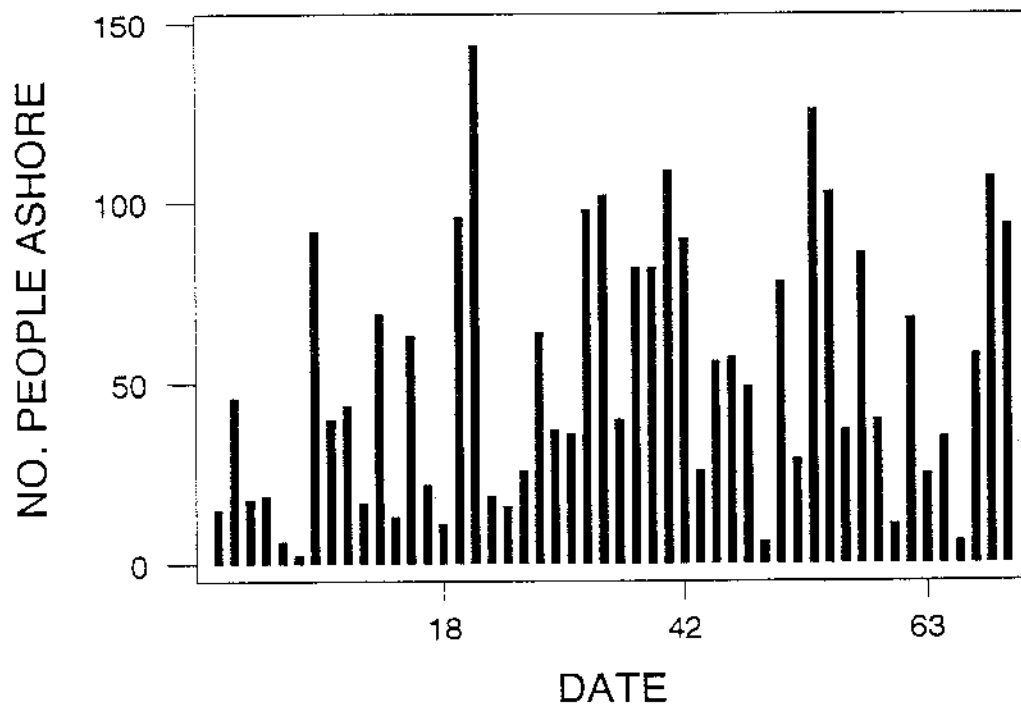


Figure 3. Seasonal variation in the daily numbers of visitors landing on the Isle of May in 1995. Day 1 = 1 May.

3.2.2 Time spent ashore

On average, the duration of a visit to the reserve by the licensed boats was $167 \text{ min} \pm \text{SE } 6 \text{ min}$ ($n = 61$; maximum = 345 min) whereas a group from a private boat remained for $98 \pm 14 \text{ min}$ ($n = 26$; maximum = 240 min). There was no seasonal change in the lengths of visits (Figure 4).

In May, the island was used by visitors for a total of 2436 person-hours. The June total was 3540 and that for 1-9 July 1068.

3.2.3 Times when visitors were ashore

Although visitors were present on the island from 0700 until 2400 hr, the majority were ashore during the period 1100-1700 hr. The time of peak use became slightly later as the season progressed (Figure 5).

3.2.4 Observations of visitors

a) North End

Observations were made from the North Horn on 19 days (Table 3). A total of 1073 visitors landed and 228 (21%) in 83 groups visited North Horn Gully, and 305 (28%) in 101 groups went to the Far Viewpoint. Totals of 2597 and 4174 visitor-minutes were spent in these two areas respectively. There were no significant seasonal trends in either the total number of people or the proportion of those landing which visited the two areas.

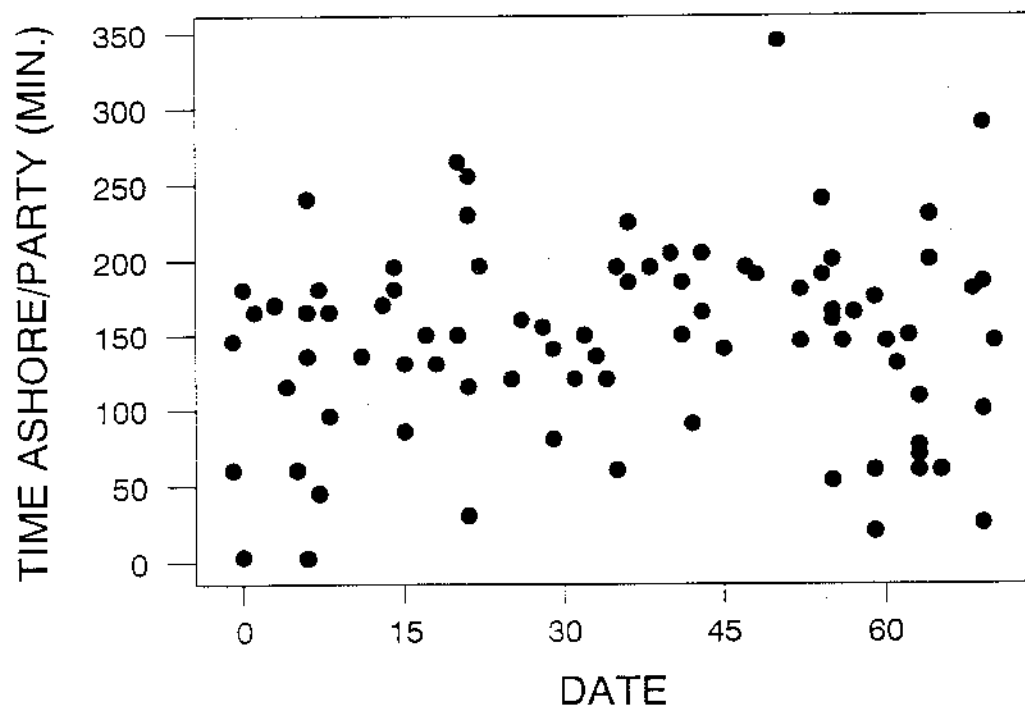


Figure 4. Seasonal variation in the time spent ashore by parties of visitors landing on the Isle of May in 1995. Day 1 = 1 May

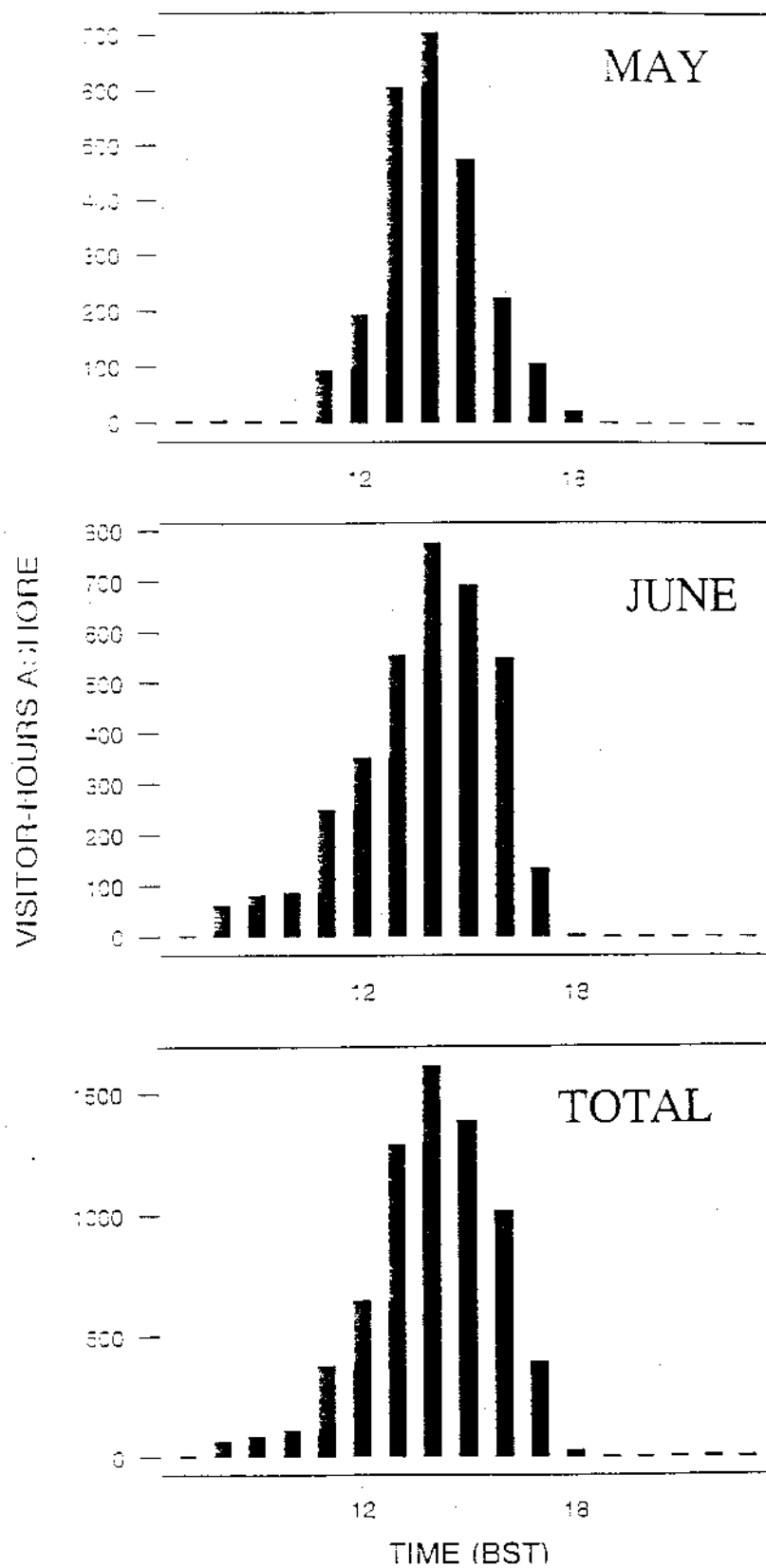


Figure 5. Diurnal pattern (in visitor hours) of use of the Isle of May by visitors in 1995. The total histogram includes all days visitors were ashore between 28 April and 9 July.

There was a suggestion that more people visited these areas when higher numbers landed at Altarstanes (ie the nearer landing) but only in the case of total visitor time spent at the Far Viewpoint was the relationship significant ($R^2 = 65\%$, $P = 0.03$). There was no significant relationship between the numbers of visitors at the north end of the island and the numbers landing at Kirkhaven.

A particularly aggressive lesser black-backed gull nested near the path just north of the North Horn. Once its chick hatched the adult regularly dive-bombed and occasionally struck people. Some visitors rose to the challenge but others were prevented from reaching the North Viewpoint. Babies carried in back-packs are at potential risk of serious injury by such gulls. Consideration should be given to destroying the nests of these few gulls.

Most visitors kept to the path but some left it and went to the South Side of North Horn Gully for a total of 6.5 visitor-hours (Table 3). Details of the most serious instances of disturbance are given later, minor violations are listed below:

- | | |
|----------|---|
| 30 April | Six adults went onto the ridge by First Gully (2 min).
One adult went onto the same ridge (1 min)
One adult went off path onto the ridge above Nybo Bridge (1 min). |
| 1 May | One adult went off path on way to North Horn (2 min).
One adult climbed over the blue rope at North Horn (2 min)
One adult went down to "beach" near First Gully (1 min). |
| 13 May | An adult plus child went off the path near First Gully and around the cliff top to North Horn Gully via two shag nests. |
| 7 June | Two adults (1 min) and later another (2 min) went off path near First Gully. |

- 16 June Five visitors from the cruise boat Alla Tarasova went off the path near First Gully, three off near the Far Viewpoint. Three members of the crew picked sea campion.
- 23 June Horn A photographer went off path repeatedly at both First Gully and North Gully.
- 25 June One adult went down gully at Far Viewpoint.
- 7 July A girl went across the blue rope into the eroded area. She was hit by the lesser black-backed gull and returned to the path.

b) South End

Observations were made from the South Horn on 12 days (Table 4). Out of a total of 706 visitors landed, 339 (48%) in 119 groups visited Lady's Bed, 359 (51%) in 129 groups passed under the South Horn and above Chatterstanes, and 194 (33%) went up the west path on to South Plateau past Greenface.

There was no seasonal trend in the percentage of visitors landing who visited Lady's Bed ($R^2 = 6\%$, $P = 0.4$) or Greenface ($R^2 = 15\%$, $P = 0.3$) but there was a highly significant decline in the percentage passing Chatterstanes ($R^2 = 68\%$, $P < 0.0001$). The reason for this is obscure. The daily total numbers visiting Lady's Bed increased significantly with the numbers landing ($R^2 = 64\%$, $P = 0.002$) but there was no such relationship for Chatterstanes or Greenface. A similar pattern was evident in terms of visitor usage. Neither of these relationships remained significant when the analysis was repeated using just days when landings were made at Kirkhaven ($n = 8$ days).

Most visitors were extremely well behaved. A few strayed off the path and went down to the rubbish tip at Lady's Cave to get better views of birds (Table 4). Other visitor misdemeanours are listed below.

- 1 May North of Lady's Cave - 5 foreign photographs went to the cliff top opposite The Cleaver and caused severe disturbance.
- 13 May A photographer went to a shag nest above Chatterstones and caused moderate disturbance and 2 children went to shag nest at Lady's Bed and chased the mate away.
- 1 June Two boatmen, joined by 2 girls, sat on cliff-top north of Pilgrim's Haven for 10 mins.
- 3 June Two people went past the end of rope at Lady's Bed to photograph two shag nests.
- 7 June A photographer lurked at the edge of Colony B for 30 mins. and then tried to feed birds with bread.
- 9 June As 3 June
- 22 June A photographer went to the north side of South Horn Gully for 3 mins. Then he went to Pilgrim's Haven where he disappeared towards Chatterstones. Reappeared after 4 min.
One person walked over to the at Colony B, thought about crossing it but decided against.

3.2.4 Major disturbances

All these were at the North end

- 29 April Three boatmen vandalized a shag nest at North Horn Gully (south) by throwing stones into the nest. One egg was smashed.
- 6 May One photographer went right over the cliff edge at both south and north sides of North Horn Gully. Total time was 38 mins. At least one guillemot egg was lost.
- 7 May One of five students at the Far Viewpoint knelt down and made "ghost impressions" and then climbed down the cliff.
- 8 May A couple from the Low Light went to the south side of North Horn Gully. Some guillemots were seen to leave, the lady threw stones (presumably at a gull), then left. Five guillemots eggs were missing from the colony when it was checked 90 mins. later.
- 13 May Five people had a picnic at North Horn. After this, one man went to the point at the south side of the Gully, saw the birds and returned for cameras and four friends. Later he called across 3+2+2 RSPB visitors. Up to nine people were there at one time for a period of 40 mins.

Egg(s) must have been lost, as two RSPB members rushed away visibly upset by what they had seen.

2 June One man and his son walked to the edge at the head of North Horn Gully. The son was encouraged to throw stones over the edge. No disturbance to birds.

4 June Seven adults and eight children went right to edge on both sides of North Horn Gully for 10 mins. Joined on south side by five more people. Severe disturbance for about 1 hour. At least 2 guillemot eggs were lost.

One teenager (of seven with two teachers) kicked over a thrift tussock and then kicked a white-topped stake repeatedly until it too went over.

10 June An incubating eider was disturbed by people for 2 hours.

16 June Eider was chased off its nest by visitors but returned in less than 5 mins.

29 June No observations were made but six very small guillemot chicks disappeared during the time visitors were present.

1 July The most severe disturbance observed during the season.

At 1543 hr a middle-aged male photographer went to the edge of North Horn Gully and over the edge at the first viewpoint. Later he reappeared, went to the far point and again disappeared over the cliff-edge.

At 1552 hr a man and a woman photographer, who had recently arrived on the island and who were due to stay at the Low Light arrived at the north side of North Horn Gully. The man went over the edge several times and at 1600 climbed down to the guillemot nesting area. About 50 disturbed guillemots were milling around on the sea in front of the colony by 1613.

At 1553 another male photographer from the Low Light arrived and at 1617 also went down into the colony which resulted in even more disturbance.

At 1632 Kate Thompson arrived on the scene and escorted the 3 Low Light visitors away. One distressed guillemot chick was calling from the sea. It had still not met up with its parent by 1715 and presumably later died.

4 BIRDS

4.1 Methods

4.1.1 Guillemot *Uria aalge*

The following breeding groups were selected to represent disturbed areas.

- 1) The top of Lady's Bed Stack. This area was colonized about 10 years ago and the birds there are less than 10 m away from the most frequently visited part of the island.
- 2) The corner between Lady's Cave (Rubbish Tip) and Lady's Bed Stack. This area was colonized 5 years ago. Birds here see few people and appear jumpy.
- 3) South Horn Bay. This group is watched by all people walking between Lady's Cave and Pilgrim's Haven.
- 4) Chatterstones (mainland part). This promontory has been colonized for 10-15 years and previous observations indicated that birds were disturbed by humans. If people remain on the path the birds do not see them. Guillemots here nest at a high density.
- 5) Greenface Viewpoint. The cliffs below the viewpoint are a well-established colony where guillemots nest at low density.
- 6) First Gully on Rona. The first gully on the west north of Nybo Bridge. The guillemots are visible from the path and attract people to leave the path.
- 7) North Horn Gully. This is a high density area where birds regularly see people. Before this study it was known that some visitors were tempted to leave the path to photograph the birds. The path goes to the north of the gully, visitors on the south side of the gully should not be there.

- 8) Far Viewpoint. This is at the extreme north end of the path and the low density colony is about 35 m away.

On days when observations of visitors were made, the number of incubating/brooding birds present in Groups 1-4 and 6-8 was counted immediately before and after the boat arrived.

Breeding output (defined as the proportion of sites where an egg was seen, or a bird was repeatedly in the incubating posture, which raised a chick to at least 14 days of age) was assessed by marking the position of eggs/chicks on photographs of these areas and regularly checking the sites to determine whether birds still had an egg or a chick. Results from these sections were compared with data from study plots which were observed daily from permanent hides. We also compared the success of visited plots, where generally pairs nested at a low density near to the top of cliffs with that of essentially similar parts of the control plots.

4.1.2 Razorbill *Alca torda*

Breeding output of pairs in the guillemot plots described above, and in an additional area at the Peregrine's Nest/Bishop's Cove Viewpoint, were followed using the same method used for guillemots.

4.1.3 Kittiwake *Rissa tridactyla*

The following groups were chosen as visited areas.

- 1) Opposite The Cleaver where most people look over the cliff-edge.
- 2) South Horn Gully where most people look over the cliff
- 3) Greenface Viewpoint
- 4) Rona First Gully.

These, plus 15 control areas, were photographed and the positions of all well-built nests marked on the prints in late May and mid-June. These nests were checked again in mid-July and on 25 July to assess how many almost-fledged young were present.

4.1.4 Shag *Phalacrocorax aristotelis*

Breeding success was assessed by (a) 6 checks of all nests (including those only half-built) on the island and (b) approximately weekly checks of nests in 12 study plots. Each nest (and plot) was then scored for visitor pressure as 1 (inaccessible), 2 (accessible but rarely if ever visited), 3 (less than 5 visits per season), 4 (6-20 visits) and 5 (area visited most days). Breeding success was estimated as the number of chicks which had fledged (or the number of large chicks present on the last check (23 July)).

4.1.5 Puffin *Fratercula arctica*

A sample of puffin burrows inside the roped-off area and within 5 m of the path at Lady's Bed were checked on 1 May. Twenty-two had eggs and these were staked with small, unobtrusive markers. The burrows were checked again on 3-9 July; those

containing a well grown chick were assumed to have been successful. Control burrows (n = 43) in the same general area but out of sight of visitors to Lady's Bed were similarly checked.

The state of burrows near the North Horn path and in the Lady's Bed Viewing area were assessed at the start and end of the season.

4.1.6 Eider *Somateria mollissima*

All nests with incubating females on West Braes, East Braes close to the path and near Logan's Road were staked during checks made at approximately 5 day intervals during May. These nests were checked every 7 days during June to assess hatching success (defined as hatched shells or membranes present) or failure. Nests within 5 m of the main paths were classified as near paths. Nigel Harding and Kate Thompson supplied hatching details for nests on South Plateau and near paths elsewhere on the island.

4.1.7 Flushing distances

Two observers walked directly to the location normally used to view a particular colony. While one watched the birds and recorded details of those which flew away onto a pocket tape-recorder, the other timed three minutes. The number of remaining birds (where possible separated into breeding and off-duty birds/ nonbreeders) and the approximate distance to the colony were then noted. Each colony was given a visitor disturbance score - 4 (visited daily), 3 (visited most days), 2 (viewed daily from study hides) or 1 (rarely visited).

4.2 RESULTS

4.2.1 Guillemot

The mean breeding success of the 9 visited groups was $0.68 \pm \text{SE } 0.3$ young per pair (Table 5). This was significantly lower than the mean for all pairs in the 5 control areas (0.81 ± 0.02 , Mann-Whitney test, $P = 0.03$). The group at Chatterstones had a markedly higher success (0.84) than the other visited areas (0.57-0.77) probably because (a) the birds were breeding at a much higher density, and such birds are often highly successful, and (b) very few tourists left the path (where they could not be seen by the birds) to look at the colony. Chatterstones had a similar nesting success to the Dense control group where birds also breed at a high density.

A further and perhaps more valid comparison was made between the visited groups (excluding Chatterstones) and the low density, upper sections of the control groups (excluding Dense). The visited group had a mean success of 0.66 ± 0.02 , that of the control groups was 0.81 ± 0.03 . This difference was highly significant (Mann-Whitney test, $P = 0.01$). Thus there can be little doubt that the visited colonies had a lower nesting success.

Observer disturbance at the visited colonies was kept to an absolute minimum so details are not available on the specific causes of failure. However it was clear that most losses occurred at the egg stage. This was similar to the situation in the control colonies where 75% of losses occurred at the egg stage and only 25% at the chick

stage. A total of 5 small young were lost at the end of the season due to human disturbance. Such losses of late young are not unusual as remaining adults become "jumpy" and are easily scared off by humans so allowing gulls to take the exposed chicks.

Details of the checks made before and after visitors are given in Tables 6 and 7. No losses were recorded at First Gully but 30 and 25 occurred at North Horn and Far Viewpoint, respectively. These values represented 20% and 50% of the maximum count of eggs in these areas. Losses at colonies at the south end of the island were trivial. There was no clear relationship between losses and visitor pressure.

Razorbill

Of 45 pairs with eggs followed in visited areas, 35 (78%) resulted in fledged young which was higher than the average success (62%) in the control areas (Table 5). This difference was mainly due to the inexplicably low breeding success of the south control area.

Kittiwake

The mean nesting success of the 4 visited areas was 0.48 ± 0.09 . There was no significant difference between these figures and the 15 control plots (Table 8: Mann-Whitney test, $P = 0.34$).

Shag

The proportion of pairs breeding in areas where they were regularly visited which fledged young (28%) was markedly lower than those in less- or rarely-visited areas

(45-58%, Kruskal-Wallis $H = 16.6$, $P = 0.002$). This was due to a reduced hatching success (ie no clutch was laid or eggs were lost) as once young had hatched, there was no significant difference in brood-size at fledging (Table 9).

The pattern of success was less clear cut in the productivity of study plots as the highest success (1.60 fledged per completed nest) at Lady's Bed and the lowest (0.16 at North Horn) both occurred at the heavily visited areas (Table 10). Shag nesting-success is known to be heavily influenced by the quality of nest-sites and further detailed analysis of the site-characteristics of these nests will be required to clarify this result.

Puffin

Twenty (91%) of the 22 burrows within 5 m of the path on Lady's Bed successfully reared chicks compared to 43 (100%) for control burrows on Lady's Bed. However, both these successes were higher than those in 3 other parts of the island (Table 11) so it is unlikely that the losses were due to human influence.

A check of burrows in the Lady's Bed Viewing Area on 16 July found just a single intact, active burrow. There were also 8 burrows which had been used this year but had been trodden in by visitors, 28 which had been trodden in during previous years, and the start of one new burrow. Three burrows were seen to be destroyed (accidentally) by visitors during watches of this area from the South Horn. A similar check of the path from the North Horn to the Far Viewpoint found 6 burrows destroyed this year and nine destroyed in previous years. Additional burrows are known to have

been destroyed by visitors at South Plateau, Greengates Viewpoint, Bishop's Cove, Rona and Holyman's Road.

During the season SNH/ITE staff collapsed 6 burrows in which birds were incubating eggs. These were "renovated" by placing large stones over the hole in the roof. The burrows were checked at the beginning of July and 4 (67%) were successful.

Eider

On West Braes, 9 (69%) out of 13 nests near paths hatched which compared with 51 (94%) of 54 further away. This difference was highly significant (Fisher exact test $P = 0.03$). There was a similar reduction in hatching success in nests near paths on South Plateau (75% vs 96%, $P = 0.05$). Hatching success was also low at Logan's Road (73% of 22 nests), an area which receives much disturbance from people waiting for boats at the Kirkhaven landing. Thus it appears as though eiders nesting near paths or subject to disturbance had a reduced chance of hatching eggs.

FLUSHING

No incubating or brooding guillemot left an egg or chick unattended during the checks but some few off-duty and/or nonbreeders did fly away. The effect was most noticeable at colonies which are rarely visited (Table 12).

Some razorbills left their eggs, but quickly returned but most took little notice of us. Most kittiwakes and shags appeared unmoved by our presence.

5 DISCUSSION

Visitor behaviour

Record number of visitors landed on the Isle of May in both May and June 1995. Each visitor remained, on average, for about 2.5 hrs during the period 1100-1700 hr with the visits becoming slightly later in the day as the season progressed. About 30% visited the viewpoints at the north end and 50% visited the colonies at the south end. Opportunistic observations elsewhere suggested that fewer people went to the viewpoint at Bishop's Cove.

In general the behaviour of people was extremely good, they kept to the paths and were considerate of both the birds and the vegetation. This was especially so at the South End where egg and chick losses which could be attributed to visitors were trivial. This appeared to be due, at least in part, to "peer pressure" as at all times visitors to Lady's Bed and near the South Horn are visible to other visitors.

The pattern at the North Horn was slightly different in that people tended to stray off the path, go right to the edge of the cliff and scare guillemots away from the colonies. Such disturbance might also have been responsible for the low productivity of shags at the Far Viewpoint. Visitors to the north end here were often in isolated groups and were noticeably less inhibited about leaving the path, which usually occurred after furtive glances towards Altarstones landing. All 9 serious incidents involving cliff-nesting seabirds occurred in this area. Of these, 2 involved people staying at the Low Light and 1 a boatman; 3 involved photographers as did 7 of 19 other instances of

people leaving the path. There is probably little to be done to prevent such disturbance apart from more intensive wardening and perhaps the provision of hides for photography.

The present regulations restrict the licensed boats to landing visitors between 1000 h and 1700 h (exceptionally 1800 h). These times minimize the impact on both guillemots and puffins which tend to (a) feed their young and (b) change-over on the egg in the early morning and in the evening (see Figure 6). A lengthening of the visitor day would have potentially serious consequences for puffins feeding young especially along Holyman's Road and other well-used paths through puffin breeding areas.

Breeding success

Guillemot colonies which were visited regularly had a lower nesting success than those which were not although there was no clear relationship between losses and visitor usage. Most losses were of eggs and very late chicks. Not all eggs and chicks which disappeared during the time that visitors were at the colonies need have been due to the people but some losses were caused by over-zealous photographers and bird-watchers.

The situation was less clear in the case of the shag as, although pairs in one visited area did extremely poorly, those in another did extremely well. The shags at the latter are extremely tolerant of disturbance having been colour-ringed and blood-sampled regularly for many years as part of longterm research studies. Probably they are fully

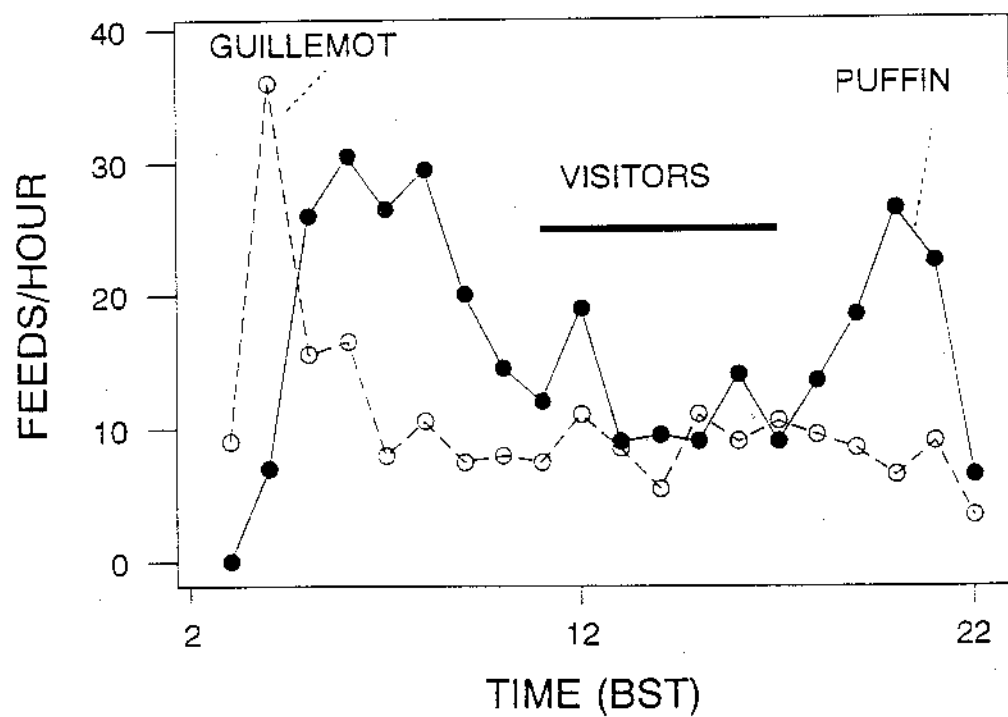


Figure 6. Diurnal feeding pattern of guillemot and puffin on the Isle of May in 1995. The figures are the hourly mean number of feeds brought to study colonies during 2 all-day watches. The line indicates the time most visitors were ashore (see Figure 5).

habituated to visitors. Prior to the wreck of adult shags in February 1994, during which 80+% of Isle of May shags died, most shags on the island were extremely tame. The surviving birds, and first-time breeders now recruiting into the population are noticeably more nervous of humans.

Nesting success of razorbill, kittiwake and puffin in the study areas were all unaffected by visitors. However, during the last few years the bulk of the puffin burrows in and near the main viewing areas have been trampled in by people despite repeated warnings by wardens in their introductory talks. Because people frequently see few puffins standing around, they have difficulty in understanding how even a minor excursion off the path into a protected area can cause any damage to burrows. The problem of burrow collapse is present all year and, indeed, is most acute when puffins are absent and visitors cannot perceive any problem.

Eider incubating near the path appear unconcerned by the close proximity of humans but in 1995 their nesting success was significantly lower, than less visited birds.

In most colonial nesting seabirds breeding success, as many other aspects of breeding, is clumped, i.e. there are typically productive and unproductive parts of the colony. The reasons behind this are unclear. Such variation occurred in both the kittiwake and shag plots followed in 1995. The North Viewpoint shags had also been followed in 1994 and again had a low productivity (0.21 compared to the overall mean of 0.68). Without more study it is impossible to be sure that this low success is directly attributable to visitors.

Habituation

Seabirds breeding in many parts of the Isle of May have regularly seen large numbers of day visitors, residents at the Low Light, research workers and wardens for the last 5-10 years. Often these birds appear to be very tame. Our standardized visits to these birds confirmed previous casual findings that (a) adult guillemots do not leave eggs unless severely disturbed, (b) some off-duty and nonbreeding guillemots in areas where they rarely see people are scared from the colony, and (c) other cliff-nesting seabirds are rarely bothered. To carry this work further with any rigour it would be necessary to cause substantially more disturbance than we did by either allowing the public access to some presently unvisited areas and/or approach the birds so closely that they start to leave their eggs. The resulting losses are so predictable that we considered such behaviour to be unjustifiable.

There is a growing awareness that although seabirds do habituate superficially to humans so that they appear to be tame they are, in fact, stressed. This can be detected by the change in their heart-rate and metabolic rate. Some details are given in Appendix 1. The increase in metabolic rate could be important when food is short or where, like female eiders, incubating birds undergo prolonged fasting.

Nonbreeding birds of all species are easily disturbed, and such disturbance may well have a serious impact on future recruitment. For instance, studies of 3 species of boobies *Sula* spp in Galapagos have shown that visits by tourists (a) resulted in changes in mating displays, and (b) birds tended not to nest close to tourist paths even though the habitat was suitable. Abstracts of some relevant papers are given

in Appendix 2. The growth of several penguin colonies has been inhibited by tourism and in one case this was due to reduced recruitment of young birds which were presumed to have gone elsewhere. Such could well be occurring among guillemots in some disturbed areas such as Lady's Bed Stack.

Whole-island counts of guillemots by SNH staff in 1995 indicated that numbers are currently increasing again after a period of slow decline. During the last period of increase guillemots appeared to have difficulty in colonising Rona. Although a thousand or more nonbreeders frequented potential breeding areas for several years they were repeatedly disturbed by visitors. However, once visitors were controlled and a nucleus of breeding birds had established themselves, many more birds rapidly recruited there and the colonies at North Horn became well established. At approximately the same time new colonies were formed on the back of Lady's Bed Stack and Chatterstones. Ringing showed that these colonies were formed by birds reared on The Maidens. Guillemots also attempted to colonise the main flat top area of Lady's Bed Stack but the few eggs which were laid were all lost to gulls after human disturbance. This is unfortunate as a colony there would be a most attractive sight. Instead, the guillemots colonised Lady's Cave where they are hidden if people remain on the path. If guillemots are to colonise these apparently suitable and attractive areas then they will need to be given some more protection.

Up to 1993 the Isle of May had one of the largest concentrations of shags in Britain and, along with the Farne Islands, had the "tamest" shags in Europe. The 1994 wreck severely reduced the population and it is estimated that it will take 30 years for

numbers to recover. The recovery started in 1995 when an extra 100 pairs bred but the main concentrations of shags are now in non-visited areas, (1) South Ness to Ardcarron and the Gully Trap, (2) Tarbet to Nybo Bridge and (3) Horse Hole. Numbers in these nesting groups have increased substantially during the last two years whereas there are now many fewer pairs near paths. These adults are far less tame than were adults prior to the wreck and it remains to be seen if new inexperienced breeder birds will try to obtain sites in visited areas and then be able to incubate their eggs successfully.

CONCLUSIONS

Visitors caused losses of guillemot eggs and chicks, failure of eider nests and possibly also reduced the nesting success of shags. Although distressing, these losses were trivial in population terms and the current numbers of visitors under the present conditions are unlikely to threaten Isle of May seabirds. However, the disturbance to nonbreeding birds will probably prevent the expansion of some of the regularly visited guillemot areas and possibly also the recolonisation of areas by shags.

The current acceptable situation is largely the result of (a) conditions in recent years having been exceptionally good for most seabirds (excepting kittiwakes), (b) the policy of restricting people to paths, and (c) the diligence of the wardens. There would doubtlessly have been more incidents in 1995 if a warden had not been constantly on patrol, both encouraging good behaviour by talking to people and instructing them on the wildlife and preventing the few persons from leaving the path. However, watching the public from the Horns it was obvious that the increasing sizes of the groups visiting

the island resulting from larger boats were causing strain on the wardening system. This was especially marked at the north end as most boats landed at Kirkhaven which resulted in an inevitable concentration of the warden's attention there. This should be remedied by having both warden's "on patrol" when more than, say, 40 visitors were ashore.

An increase in either the maximum numbers of visitors allowed ashore at any time, or an extension of the time visitors were allowed ashore would inevitably result in greater disturbance to the birds, damage to burrows, and a general degradation of the "island experience" for visitors even if the level of wardening was increased.

Most disturbance is caused by a few people, mainly photographers. It might be possible to alleviate this by the provision of hides or simple blinds at a few selected areas.

CAPTIONS FOR FIGURES

Figure 1. Place names and locations of colonies (solid circles) at the south end of the Isle of May where the behaviour of visitors was studied from the North Horn in 1995.

Figure 2. Place names and locations of colonies (solid circles) at the north end of the Isle of May where the behaviour of visitors was studied from the South Horn in 1995.

Figure 3. Seasonal variation in the daily numbers of visitors landing on the Isle of May in 1995. Day 1 = 1 May.

Figure 4. Seasonal variation in the time spent ashore by parties of visitors landing on the Isle of May in 1995. Day 1 = 1 May

Figure 5. Diurnal pattern (in visitor hours) of use of the Isle of May by visitors in 1995. The total histogram includes all days visitors were ashore between 28 April and 9 July.

Figure 6. Diurnal feeding pattern of guillemot and puffin on the Isle of May in 1995. The figures are the hourly mean number of feeds brought to study colonies during 2 all-day watches. The line indicates the time most visitors were ashore (see Figure 5).

Table 1. Visitors to the Isle of May 29 April to 9 July 1995.

Date	Type of Boat	Landing Time	Mins. Ashore	Landing Used	Adults	Children
April 29	S	1435	145	A	9	2
	P	1505	60	K	4	
30	C	1315	60	K	3	
	S	1405	180	A	30	13
May 1	S	1345	165	A	17	1
3	S	1455	170	K	19	
4	S	1535	115	K	6	
5	I	1820	60	K	2	
6	P	0715	135	K	4	
	P	1045	240	K	2	2
	S	1530	165	K	51	5
	S	1530	165	K	22	4
	P	1655	65	K	2	
7	P	1255	45	K	1	
	S	1310	180	K	34	5
8	S	1300	165	K	35	7
	P	1515	95	K	2	
11	S	1135	135	A	8	9
13	S	1340	170	K	49	20
14	B	1215	195	K	13	
	S	1330	180	K	23	1
15	S	1405	85	K	52	5
	S	1405	130	K	6	0
17	S	1420	150	A	20	2
18	S	1520	130	K	11	
20	B	1105	265	A	10	1
	S	1120	150	K	75	10
21	A	1115	230	A	12	
	B	1145	255	A	12	
	S	1255	115	K	102	8
	P	?1400	?60	A	2	8
22	S	1330	196	K	14	5
25	S	1235	120	K	15	1
26	S	1150	160	K	20	6
28	S	1335	155	K	50	14
29	S	1315	140	K	44	0
	P	1510	80	K	3	
31	S	1345	120	K	28	8

Table 1 continued.

Date		Type of Boat	Landing Time	Mins. Ashore	Landing Used	Adults	Children
June	1	S	1430	150	K	21	13
	2	S	1515	135	K	24	5
	3	S	1545	120	K	94	4
	4	S	1100	195	K	56	42
	5	P	1745	(60)	K	(4)	
		S	1130	185	K	24	13
		P	1230	90	K	3	
	P	1440	135	K	3		
	7	CB	1330	195	K	82	
	9	CB	0815	205	A	82	
	10	S	1155	185	A	98	6
		S	1430	150	A	5	
	11	I	1330	90	K	6	6
	12	B	1140	205	A	8	
		S	1325	165	A	18	
	14	S	1330	140	A	31	25
	16	CB	1345	195	A	57	
	17	S	1100	190	K	43	6
	19	B	1015	345	K	6	
	21	S	1400	180	K	32	2
	22	S	1500	145	K	40	4
	23	S	1155	190	K	26	2
		B	1015	240	K	1	
	24	B	1110	200	K	10	
		S	1255	160	K	88	22
		P	1337	53	K	5	
		P	1426	166	K	1	
	25	S	1350	145	A	90	13
	26	S	1405	165	K	35	2
	28	S	1410	175	K	45	35
	P	1445	(60)	A	3		
	P	1800	20	K	3		
29	S	1440	145	K	37	3	
30	S	1455	130	K	11		
July	1	P	1230	150	A	5	
		P	1230	150	A	3	
		S	1505	150	K	51	9
	2	P	1132	60	K	2	
		P	1520	70	K	2	
		P	1424	76	K	2	
		S	1542	108	K	15	4
	3	B	1015	230	K	4	5
		S	1030	200	K	22	4

Table 1 continued

Date	Type of Boat	Landing Time	Mins. Ashore	Landing Used	Adults	Children
July 4	P	(1440)	(60)	K	6	
3	P	2030	180	East Rona	7	
7	S	1405	180	K	40	18
8	P	1200	25	K	2	1
	S	1455	185	K	81	19
	A	1600	290	A	2	
	P	1630	100	K	2	
9	S	1220	145	A	66	28

Notes:-

1) A = Altarstones, K = Kirkhaven

2) S = Sapphire and/or Serenity, A = Aspire, B = Breadwinner, CB = Cruise boat, C = Canoe, I = Inflatable, P = Other private boat.

Table 2. Monthly and annual totals of visitors to the Isle of May 1988-1995.

	1988	1989	1990	1991	1993	1994	1995
MAR				8	11		
APRIL		138	47	18	18	39	48
MAY	189	684	681	915	710	650	682
JUNE	816	1005	736	833	1026	1200	905
JULY	335	1137	806	1010	1095	1028	1760
AUG	443	629	774	1388	860	1618	1745
SEPT		233	178	313	187	261	264
OCT						19	23
Total	1783	3826	3222	4485	3907	4815	5427

Note: Figures for earlier years are from the 1994 warden's report

Table 3. Visitor usage as observed from the North Horn

North Horn Gully											
Landing used	South Side			North Side			Far Viewpoint		Total visitors on island		
	V	P	Visitor minutes	V	P	Visitor minutes	V	P		Visitor minutes	
April 29	A	0	0	0	7	3	19	0	0	0	11
	A	0	0	0	0	0	0	12	4	179	43
May 1	A	0	0	0	0	0	0	16	7	46	18
	K	1	1	38	1	1	38	66	14	1162	56
	K	0	0	0	0	0	0	30	8	309	39
	K	0	0	0	1	2	22	8	2	24	42
	K	0	0	0	18	3	216	11	4	152	69
June 2	K	0	0	0	10	2	76	11	5	16	29
	K	30	4	285	59	9	707	47	8	179	92
	K	0	0	0	0	0	0	0	0	0	82
	A	0	0	0	40	23	350	7	5	83	82
	A	0	0	0	19	4	277	40	7	701	109
	A	0	0	0	28	12	350	6	3	160	57
	K	0	0	0	7	3	66	11	7	126	34
July 1	K	1	1	7	6	3	67	14	8	213	28
	A	0	0	0	9	4	221	16	5	390	103
	K	0	0	0	2	1	16	5	3	131	37
	K	0	0	0	10	4	106	9	2	143	60
7	K	0	0	0	9	3	66	26	9	160	58
Total		32	6	330	226	74	2597	335	101	4174	1049

Notes: 1. V = number of visitors, P = number of parties.

2. A = Altarstanes, K = Kirkhaven.

3. All time spent on the South Side of North Horn Gully was by visitors who were off the path.

Table 4. Visitor usage as observed from the South Horn.

Date	Landing used	Lady's Bed			Lady's Cave			Chatterstones			Greenface			Total visitors on island
		V	P	Visitor-minutes	V	P	Visitor-minutes	V	P	Visitor-minutes	V	P	Visitor-minutes	
April 30	A	14	3	337	0	0	0	34	6	167	No observations			43
May 1	A	8	3	70	0	0	0	22	8	6	No observations			18
6	K	59	15	501	0	0	0	59	19	38	No observations			56
7	K	22	10	242	0	0	0	33	12	30	13	4	10	39
13	K	27	11	252	11	3	40	28	10	22	26	8	59	69
June 1	K	28	7	206	2	1	2	23	9	10	7	3	4	34
3	K	27	12	274	1	1	2	27	13	5	5	3	8	98
5	K	15	6	120	0	0	0	21	6	0	1	2	6	37
7	K	32	12	605	5	3	22	22	11	3	1	3	15	82
9	A	34	15	614	0	0	0	24	9	2	7	3	30	82
10	A	54	16	405	4	2	10	22	11	2	15	8	18	104
22	K	19	9	149	1	3	15	34	15	26	12	4	44	44
Total		339	119	3775	24	13	91	349	129	311	87	38	194	706

Notes: 1. V = number of visitors, P = number of parties.

2. A = Altarstones, K = Kirkhaven.

3. All time spent at Lady's Cave was by visitors who were off the path.

Table 5. Nesting success of guillemots and razorbills in visited and control areas.

Visited	Guillemot			Razorbill		
	Incubated	Fledged	Success	Incubated	Fledged	Success
Lady's Bed	14	10	0.71	-	-	-
Lady's Cave	11	7	0.64	-	-	-
South Horn	11	9	0.64	8	8	1.0
Chatterstones	118	99	0.84	-	-	-
Greenface Viewpoint	22	17	0.77	7	5	0.71
Rona Gully	9	6	0.67	-	-	-
North Horn Gully (S)	38	25	0.66	-	-	-
North Horn Gully (N)	14	8	0.57	-	-	-
North Viewpoint	51	30	0.59	-	-	-
Bishops Cove Viewpoint	-	-	-	30	22	0.73
Mean±SE			0.68±0.03			0.81±0.10
"Control" - all						
Dense	272	220	0.80	-	-	-
Hide/White Lodge	91	69	0.76	21	16	0.76
Colony 4	224	182	0.80	40	29	0.72
South	45	40	0.89	17	6	0.35
Cornerstone	170	135	0.79	65	43	0.66
Mean±SE			0.81±0.02			0.62±0.09
"Control" - top, low density areas						
Hide	75	57	0.76			
Colony 4	42	33	0.79			
South	45	40	0.89			
Cornerstone	75	55	0.71			
Mean±SE			0.81±0.03			

Table 6. Numbers of guillemot eggs or chicks in visited areas at the North Horn before (B) or after (A) visits by tourists.

Date	First Gully		North Horn Gully South		North Horn Gully North		Near		Far Viewpoint		Losses		Visitor Usage (mins)	
	B	A	B	A	B	A	B	A	B	A	North + South	Far View Point	North + South	Far View Point
April	29	1	0	0	7	7	3	1	3	1	0	4	19	0
	30	2	0	0	12	12	3	4	2	2	0	0	0	179
May	1	2	0	0	22	22	6	6	2	2	0	0	0	46
	3	2	0	0	22	21	6	6	5	3	1	0	?	?
	4	2	0	0	24	26	9	7	5	5	0	2	?	?
	6	2	1	1	24	25	10	12	6	7	0	0	76	1162
	7	2	2	3	26	27	12	12	8	9	0	0	0	309
	8	2	7	6	84	80	18	17	9	9	5	1	22	24
	13	7	20	20	81	82	23	21	11	10	0	3	216	152
	14	6	20	20	90	84	25	29	13	14	6	0	?	?
June	1	7	39	39	99	97	35	30	16	14	2	7	?	?
	2	9	41	41	104	104	30	30	14	14	0	0	76	16
	4	9	43	46	102	99	31	34	14	15	3	0	?	?
	5	8	47	47	99	94	33	27	15	15	5	6	992	179
	7	6	15	16	50	51	20	21	12	12	0	0	0	0
	9	6	15	15	39	38	25	26	12	11	1	1	350	83
	10	6	13	13	36	37	29	29	13	13	0	0	277	701
	16	6	17	17	37	37	28	28	9	9	0	0	350	160
	21	5	17	17	34	34	27	27	12	13	0	0	66	126
	23	5	13	13	22	22	19	19	11	11	0	0	74	213
	25	6	15	15	21	21	23	23	10	10	0	0	221	390
	26	6	12	12	20	20	15	15	11	11	0	0	16	131
	29	4	12	10	17	13	10	10	7	6	6	1	?	?
July	1	4	8	8	16	15	10	10	6	6	1	0	106	143
	2	3	7	7	16	16	9	9	6	6	0	0	?	?
	7	0	4	4	16	16	5	5	2	2	0	0	66	160

Notes: 1) Comparison of an area are valid within a day, those between days are not because different areas were sometimes counted on different days.
2) Increases occurred during visits due to birds laying between checks.

Table 7. Numbers of guillemot eggs or chicks in visited areas at the South Horn before (B) and after (A) visits by tourists.
Mins. of visitor usage

Date	Lady's Bed		Lady's Cave		South Horn		Chatter-stanes		Losses	Lady's Bed		Lady's Cave		Chatter-stanes
	B	A	B	A	B	A	B	A		B	A	B	A	
May	4	2	3	0	0	3	48	49	1	?	?	?	?	?
	6	4	4	0	0	2	62	65	0	501	0	33	38	38
	7	4	4	1	1	2	76	79	0	242	33	?	30	30
	8	5	5	1	1	3	78	79	0	?	?	?	?	?
	11	5	5	3	3	6	82	87	0	?	?	?	?	?
	13	8	7	5	6	10	97	100	1	252	40	?	22	22
	14	8	8	6	6	7	104	105	0	?	?	?	?	?
	15	8	8	6	8	7	105	111	0	?	?	?	?	?
	1	12	12	9	8	7	106	105	1	206	2	?	10	10
	2	13	13	8	10	6	118	118	0	?	?	?	?	?
June	3	13	13	10	10	10	114	114	0	274	?	?	5	5
	4	14	14	10	10	10	113	113	0	?	?	?	?	?
	5	13	13	11	10	10	117	117	0	120	0	?	0	0
	7	14	14	10	10	10	109	109	0	605	22	?	3	3
	9	14	14	10	11	11	120	120	0	614	0	?	2	2
	10	15	15	10	10	10	111	111	0	405	10	?	?	?
	19	13	13	-	-	10	109	109	0	?	?	?	?	?
	28	9	9	8	7	10	47	47	0	?	?	?	?	?
	29	9	10	8	8	6	34	34	0	?	?	?	?	?
	1	8	8	7	7	7	41	44	1	?	?	?	?	?
July	4	8	8	7	6	7	30	30	1	?	?	?	?	?
	5	7	6	4	4	2	13	14	1	?	?	?	?	?

Notes: 1. Increases in numbers during visits were due to bird laying
2. No visitor usage figures are available for South Horn
3. Usage figures for Chatterstones are for people leaving the path

Table 8. Breeding success of kittiwakes in visited and control plots.

	No. of nests	No. of young fledged			Total young fledged	Young/nest
		0	1	2		
Visited						
1. South Horn	42	20	22	0	22	0.52
2. Above Cleaver	39	20	9	0	9	0.23
3. South Plateau Viewpoint	37	20	14	3	20	0.54
4. North Horn	31	16	10	5	20	0.65
Mean						0.48
SE						0.09
Control						
1. Cleaver	42	22	16	4	24	0.57
2. Pilgrim's Haven	33	20	12	1	14	0.42
3. South Face	32	26	5	1	7	0.22
4. Colony 4	121	80	40	1	42	0.35
5. Cornerstone	76	37	34	5	44	0.58
6. Loch (S)	65	39	26	0	26	0.40
7. Loch (N)	103	57	37	9	55	0.53
8. Greengates	83	67	14	2	18	0.22
9. Bishop's Cove	57	31	22	4	30	0.53
10. Horse Hole	6	3	3	0	3	0.50
11. Iron Bridge	47	24	20	3	26	0.55
12. Rona	32	20	11	1	13	0.41
13. Tarbet	118	91	26	1	28	0.24
14. Low Light	34	32	2	0	2	0.06
15. Colm's Hole	25	17	7	1	9	0.36
Mean						0.40
SE						0.04

Table 9. Breeding success of all shag nests (including those partly built) on the Isle of May in 1995 in relation to human visitation

Disturbance	No. of nests	Fledged at least one young (n)	%	Mean number of young fledged per pair which hatched their eggs (n) Mean
Inaccessible	40	23	57.5	25 1.96
Rarely visited	49	22	44.9	24 1.46
Few visits	271	129	47.6	139 1.79
Moderate visits	157	85	54.1	91 1.96
Visited most days	53	15	28.3	16 1.94

Table 10. Breeding output of shags nesting in study plots in relation to visitation.

Disturbance	Location	No. of completed nests	Mean number of young fledged per nest
Inaccessible	Chatterstanes	4	1.25
	Mill Door (N)	11	1.27
	Tarbet	9	1.33
Rarely visited	Pilgrim's Haven (S)	12	1.25
	Horse Hole	20	1.25
Few visits	Maidens	9	0.33
	Mill Door (S)	10	0.90
	Low Light	15	0.73
	Colm's Hole	6	0.83
Visited most days	North Horn Viewpoint	31	0.16
	Lady's Bed Viewpoint	10	1.60

Table 11. Breeding success of puffins.

Area	Eggs	Young fledged	Success/pair
a) Lady's Bed			
Viewpoint	13	≤1	0.08
Inside protected area	22	20	0.91
Well outside human influence	43	43	1.00
b) Other areas			
Kirkhaven/Kettle	45	38	0.84
Burrian	45	36	0.80
Rona	47	33	0.70

Note: Success at the Viewpoint was based on active burrows rather than eggs known to have been laid.

Table 12. Habituation tests: Numbers of birds present at colonies (and the number which left during 3 mins) approached by 2 observers to normal viewing distance.

Area	Distance (m)	Guillemot		Razorbill		Kittiwake		Shag		Visitation
		Br	OD	Br	OD	Br	OD	Br	OD	
Lady's Bed Stack	12	42	43(4)	1(1)	0	15	1	3	1(1)	4
Lady's Cave	15	8	9	6	4	15	4	0	2	4
Inside Cleaver	15	0	0	2	1	20	4(1)	0	0	4
Above Maidens	5	24	24(21)	2	2	2	1	3	1	1
South Horn Bay	20	17	14	20	14(3)	69	7(4)	0	0	4
Chatterstones	30	120	110(33)	0	0	0	0	0	0	3
Angel (N of)	15	11	3	10	5	36	14	0	0	4
Colony B (S)	12	—	218	0	0	0	0	0	0	3
N (1)	10	—	13	—	12	20	10	0	0	3
N (2)	30	—	216	—	13	34	8(1)	0	0	3
Colony 4	15	—	142	—	40	46	7	0	0	2
South Face	35	—	77	—	14	30(3)	8	2	1	2
North Horn Gully	5	11	11	1	1	27	3	2	0	4
	15	—	230(15)	—	2(2)	6	1	1	0	4
	7	—	73(7)	1	1	30	3(1)	1	1(1)	2
Far Viewpoint	25	40	46(20)	0	0	0	0	11	13	4
Rona	7	—	22(5)	14(3)	1	16	11	6	0	1
Horse Hole	7	—	40(1)	—	4	1	0	0	0	1
Loose Tooth	7	—	7	12(1)	15(2)	20	6	0	0	1
	7	42	28(4)	2	1	3	0	0	0	1
Sheep Well	30	24	27(13)	12	22	19	11	0	0	1

Notes 1) Checks made 8 & 9 June

2) The visitation scores are 4 (daily), 3 (most days), 2 (daily/study colony) and 1 (rarely see people that close)

3) Br = Incubating or brooding, OD = off-duty breeders and nonbreeders